

is far from being a mere abstract of the larger work. Huxley's energy, industry and fixity of purpose are brought into due prominence; while his intellectual keenness and honesty, his intolerance of pretentious ignorance, his appreciation of everything good in art and literature, his jealousy for the right use of the mother tongue, his admirable social and domestic qualities, all have ample justice done to them in the pages of this modest volume.

The attentive reader will easily discern how it is that among the great names of the Victorian epoch few take a higher place than that of Huxley. Eminent as an original worker in science, whose investigations covered an unusually wide field, he was scarcely less distinguished as a philosopher and as a practical man of affairs. By dint of unwearied industry, of a single-minded love of truth and of a nature at once candid and fearless, he made for himself a reputation in the intellectual life of the last century which will outlive many of those that, for the time being, bulked more largely in the public view.

In controversy, as Mr. Davis often reminds us, Huxley was a strenuous but never ungenerous adversary, though it sometimes seemed hard for him to realise that his opponents might hold their convictions as sincerely as he did his own. The popular notion of Huxley as an intellectual pugilist who found his chief delight in propounding dogmas, the more startling the better, in science and philosophy, is scarcely borne out by the facts of his career. It is true that in his own judgment he was "rather prone to jump at conclusions," and when he felt sure of his ground no man could speak with greater confidence. But questions, even of the first magnitude, as to which the data were not in his opinion sufficient for a solution, were by him left open to the end.

Perhaps the most conspicuous instance of this truly "agnostic" attitude was the position he took up in reference to Darwin's theory of natural selection. Curiously enough, while his acceptance of the fact of evolution was hastened, if not caused, by the publication of the views of Darwin and Wallace, he never committed himself to an unqualified approval of those views. He was converted by, but not to, the doctrine of natural selection. This, however, did not prevent him from acting as Darwin's champion against attacks dictated by ignorance and prejudice, nor from treating the Darwinian hypothesis as "the most powerful instrument of investigation which has been presented to naturalists since the invention of the natural system of classification, and the commencement of the systematic study of embryology."

It is probable that we here touch upon one of Huxley's limitations. Unrivalled as he was in many departments of biology, it is clear that field natural history did not come to a great extent within his sphere of mental activity. Had this been otherwise, and had his attention been more directed to the study which now goes by the name of bionomics, it seems fair to conjecture that his views as to the validity of

Darwin's theory might have undergone some modification.

There are certain slips in Mr. Davis's book which should be remedied in a future edition. We note a few, as follows:—*Ephestia elatella* (*recte* *elutella*) is not a "small beetle," but a Phycid moth. In the letter given on pp. 204-5, Huxley wrote "inconceivable," where Mr. Davis has "conceivable" with much detriment to the sense of the passage. Finally, Duns Scotus we know, and Scotus Erigena we know, but who is Scotus Erigenus?

F. A. D.

PHYSICAL AND INORGANIC CHEMISTRY.

- (1) *Practical Physical Chemistry*. By Dr. Alex. Findlay. Pp. xii+282; illustrated. (London: Longmans, Green and Co., 1906.) Price 4s. 6d. net.
- (2) *Physical Chemistry in the Service of Medicine*. Seven addresses by Dr. Wolfgang Pauli. Translated by Dr. Martin H. Fischer. Pp. ix+156. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1907.) Price 5s. 6d. net.
- (3) *Vorlesungen über anorganische Chemie für Studierende der Medizin*. By Dr. Ernst Cohen and Dr. P. van Romburgh. Pp. viii+431; illustrated. (Leipzig: Wilhelm Engelmann, 1906.) Price 15 marks.

(1) **S**LOWLY but surely the necessity of systematic laboratory instruction in the methods of physical chemistry is being recognised. One of the causes which may have contributed to the absence of such instruction in many university courses of chemical study has been the lack of a suitable practical textbook. With the appearance of Dr. Findlay's work this regrettable deficiency in laboratory literature can, however, be no longer said to exist. The apparatus required for the measurement of density, viscosity, surface-tension, refractive index, molecular weight, conductivity, transport numbers, electromotive force, velocity of chemical change, solubility, transition temperatures, and thermal changes is described, and instructions for the carrying out of the measurements are given in an easily intelligible form.

The course is modelled on that of the Leipzig school, which for many years occupied a unique position as the Mecca of students of practical physical chemistry. This is doubtless partly due to the author's personal association with this particular school. It may perhaps account for the omission of several important types of experimental exercises. In particular, electrochemical experiments involving the estimation and separation of the metals and the preparation of different classes of compounds afford many valuable applications of physicochemical principles, and the omission of chapters dealing with these phases of the subject is regrettable. Some difficulty may be experienced in interpreting what is meant by the term "maximum apparent error" in the first chapter. With a vocabulary of errors in which relative, absolute, possible, probable, and apparent errors may be spoken of, a careful definition of terms is essential. In the dilatometric determination of transition temperatures (p. 274), Glauber's salt is not

nearly so suitable as some other substances for the purposes of a laboratory exercise.

Of the usefulness of the book as a laboratory guide there can, however, be no doubt; it should be in the hands of every serious student of the science.

(2) Dr. Pauli's volume is a collection of seven addresses delivered at various times by the author, and deals with the application of physical chemistry to various branches of medicine—physiology, pharmacology, and pathology—an application rendered possible more particularly by the recent advances made in the study of organic colloids. The problems discussed are of fundamental importance, and even though it be true that "life can perhaps be completely understood only through life itself," yet the volume before us indicates that many great advances may be expected by the proper utilisation of the instruments afforded by physical chemistry. In the separate chapters an account is given of the physical chemistry of cells and tissues, the colloidal state and the reactions in living matter, the relations between ions and their medicinal and therapeutic effects, the changes effected in pathology by recent chemical work, and the significance of the electrical charge of protein. The entire omission of literature references to the large number of investigations by authors whose names are quoted is most unfortunate. The translation is good, although it is not difficult to recognise in it the work of a medical man rather than that of a physical chemist. In medical circles the book should be of general interest.

(3) A distinctive feature of the lectures on inorganic chemistry is the authors' attempt to minimise the number of chemical compounds described, and to illustrate by carefully selected examples the most important general phenomena and the laws which regulate them. In the opinion of one who has had some little experience in the chemical training of medical students this is a distinctly gratifying feature. Whether it is not possible greatly to improve the training of the medical student by demanding a smaller knowledge of isolated facts and a more extended acquaintance with general principles is a question which demands serious consideration. In the twenty-eight lectures, into which the subject-matter is divided, the attention of the reader is continually directed to general relationships in discussing particular facts, and this cannot but have a satisfactory effect on the chemical aspect of the future medical man. For 430 pages of elementary inorganic chemistry fifteen marks is a singularly high price to have to pay, and may be prohibitive to many would-be purchasers.

H. M. D.

OUR BOOK SHELF.

Practical Coal Mining. By Leading Experts in Mining and Engineering. Edited by Prof. W. S. Boulton. Divisional, vol. 1. Pp. vii + 160. (London: The Gresham Publishing Company, 1907.) Price 6s. net.

This is the first instalment of a work which, when completed in six volumes, is intended to cover the whole ground of modern coal-mining practice. Each of the sections into which the work is divided

will be written by a different author, fourteen leading authorities cooperating with the editor in his task. This division of responsibility among many contributors, and the fact that orders are accepted for complete sets only, render it difficult to judge from the first volume what the value of the work as a whole will be.

In the first volume there is undoubtedly a certain want of harmony in treatment of the subject-matter. There are three sections and part of the fourth, dealing respectively with the geology of the Coal-measures, the composition and analysis of coal, trial borings, and shaft sinking. The section on geology, written by the editor, covers sixty-six pages, and contains much useful information. It is questionable, however, whether, in a treatise on practical mining, it is possible to deal usefully with so comprehensive a subject or to give sufficient detail to render the geological manuals superfluous. As an illustration, the information regarding foreign coalfields, which has had to be compressed into a single page, is not nearly so full as that contained in Geikie's "Text-book of Geology."

The editor's literary style, too, is far from faultless. His opening sentence, for example, cannot be regarded as elegant in composition. It reads as follows:—"While some knowledge of geology is necessary for all mining engineers and others connected with coal mining, and especially the ability to construct and interpret geological plans and sections, there are certain branches of the science which bear upon coal mining only very indirectly, and which at present are of theoretical rather than practical importance, and which, therefore, it has been thought advisable to omit in the following pages."

The second section, on the composition of coal, has been written by Mr. C. A. Seyler. It describes the author's new system of classification, or rather of new chemical terms, and does not seem likely to commend itself to practical men, who would probably find such expressions as "sub-para-bituminous-pseudo-anthracitic species" somewhat cumbersome. The third section, on trial borings, which has been written by Mr. H. F. Bulman, is admirable. It contains as much practical information as could possibly have been compressed into thirty pages. The fourth section, on shaft sinking, as far as published, is equally good. Written by Prof. H. Louis in excellent literary style, the information is clearly given, and its value is increased by the introduction of hitherto unpublished details of cost, and by the fact that the illustrations, unlike others in the volume, have in every case an indication of the scale to which they are drawn.

Morale de la Nature. By M. Deshumbert. Pp. 74. (London: D. Nutt, 1907.) Price 1s. net.

The first part of this essay is devoted chiefly to the thesis that the object of all creation is to produce those forms of life which are the most active, intelligent, and moral possible, that is, life in its most complete form. Good is that which contributes to the increase of life in its high development, and evil is that which has a contrary effect. The latter half of the essay consists of ethical aphorisms which we commend to the notice of the Moral Instruction League.

Spring Harbingers and their Associations. By M. G. B. Pp. 62. (London: Elliot Stock, 1907.)

THE writer of these six short essays on the snow-drop, violet, daffodil, cowslip, daisy, and rose, not only loves flowers, but evidently has made a practice of recording references to her favourites made by the poets she has read—and these are a goodly company.